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The Virtual Heliospheric Observatory VHO

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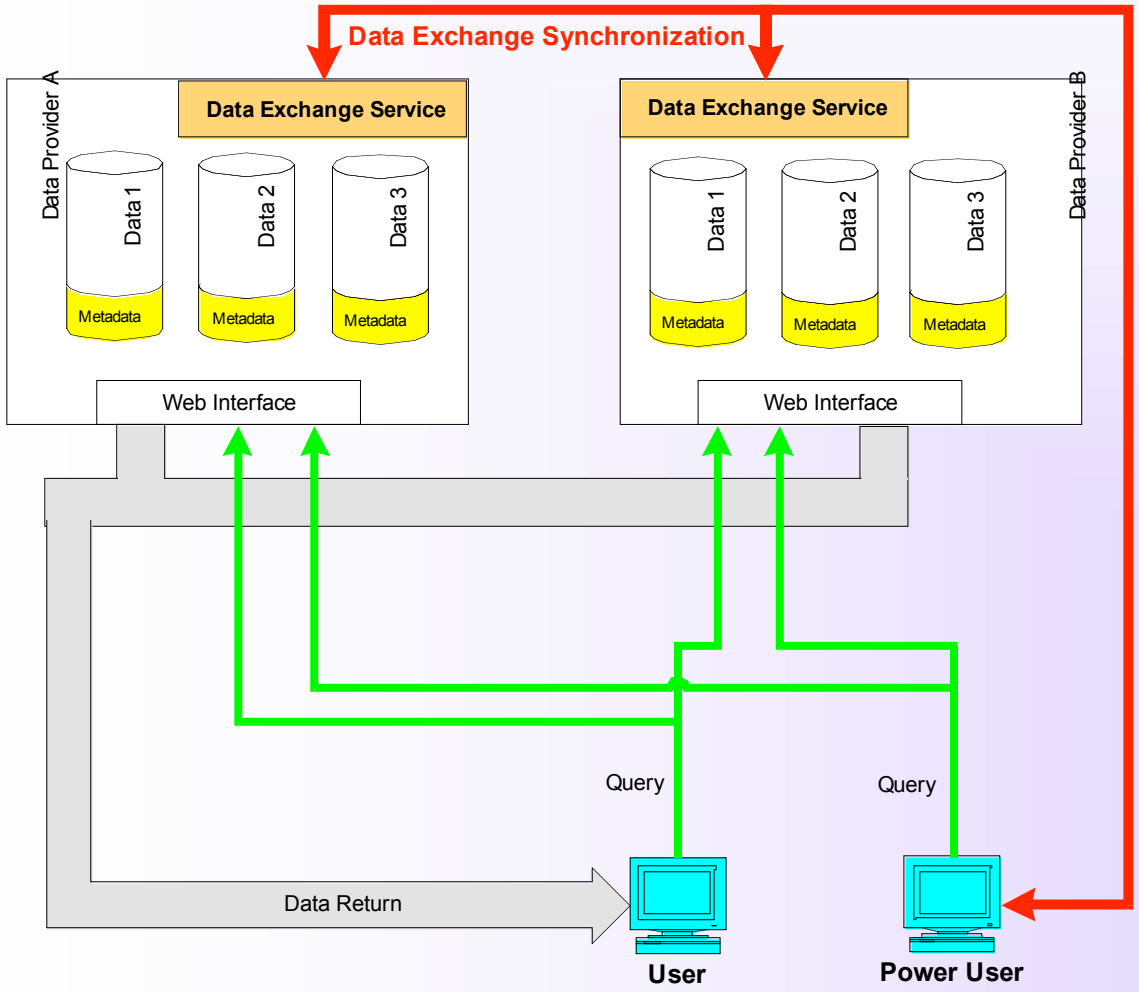
Primary Purpose of VHO

- Enable wider access to and use of the best quality heliospheric data.
- Enable complex queries on distributed data.
- Encourage the generation of new multi-instrument, multi-spacecraft data products.
- Provide common tools for data analysis.

VHO Architecture

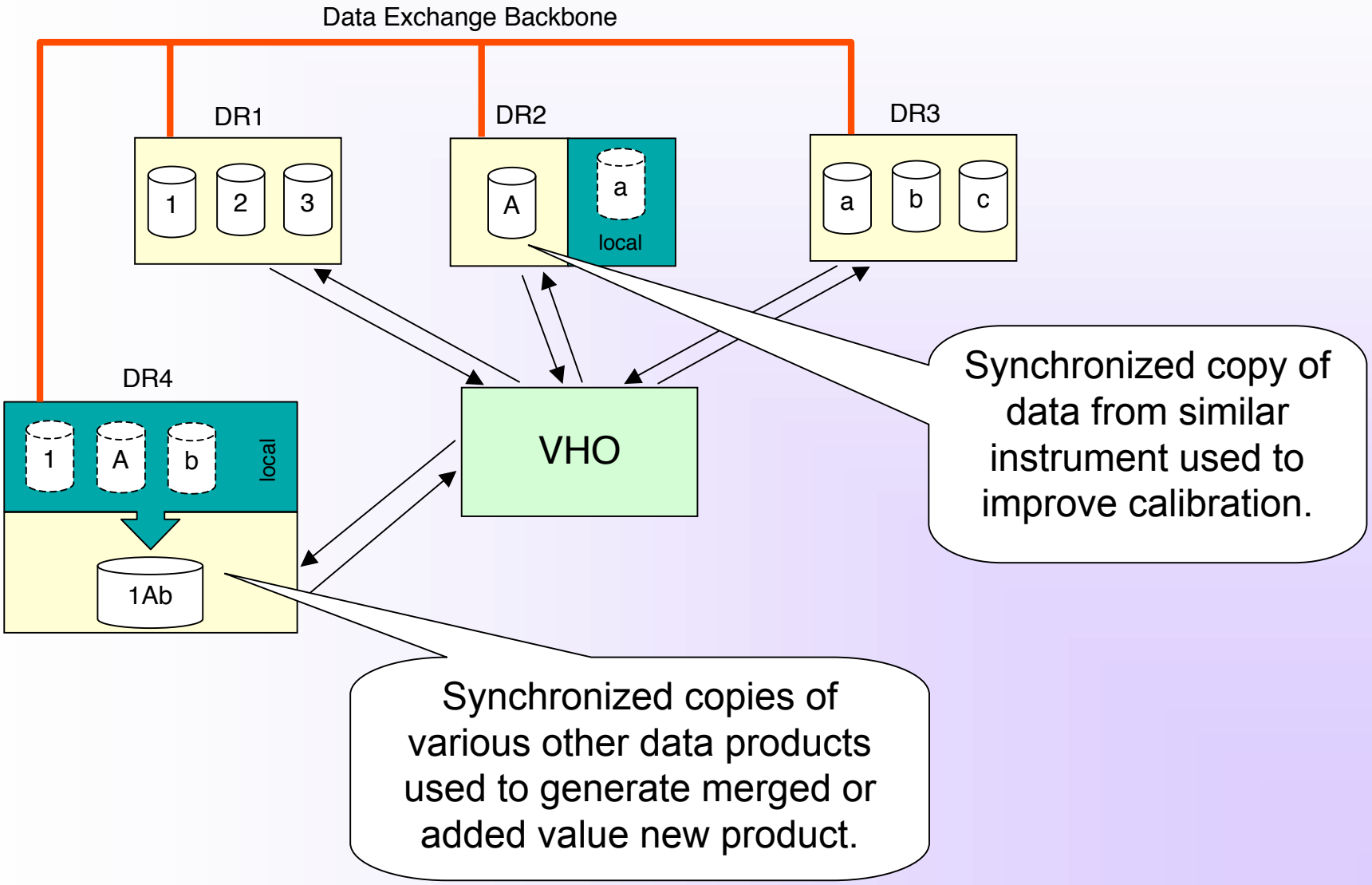
- Lightweight middleware with search capability.
- Common metadata description of products and services based on SPASE dictionary.
- Data exchange and synchronization mechanism.
- Minimum possible requirements on data providers.
- Low cost extensible system deployed in phases.

VHO Development Phases (1)
L1 Data Environment

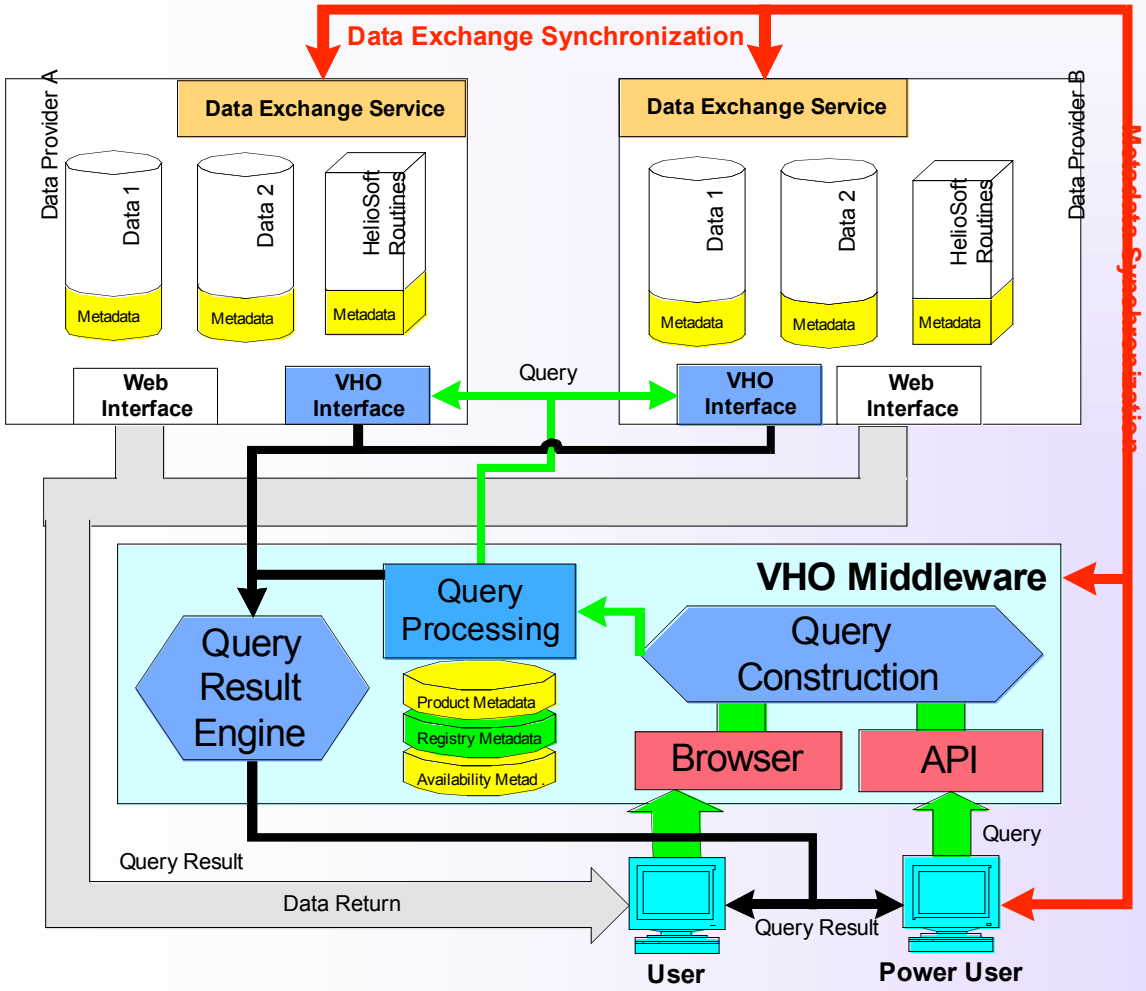


- L1 data sets made web accessible.
- Data products described in SPASE compliant metadata format.
- Data exchange synchronization established between data providers.

Data Exchange Synchronization

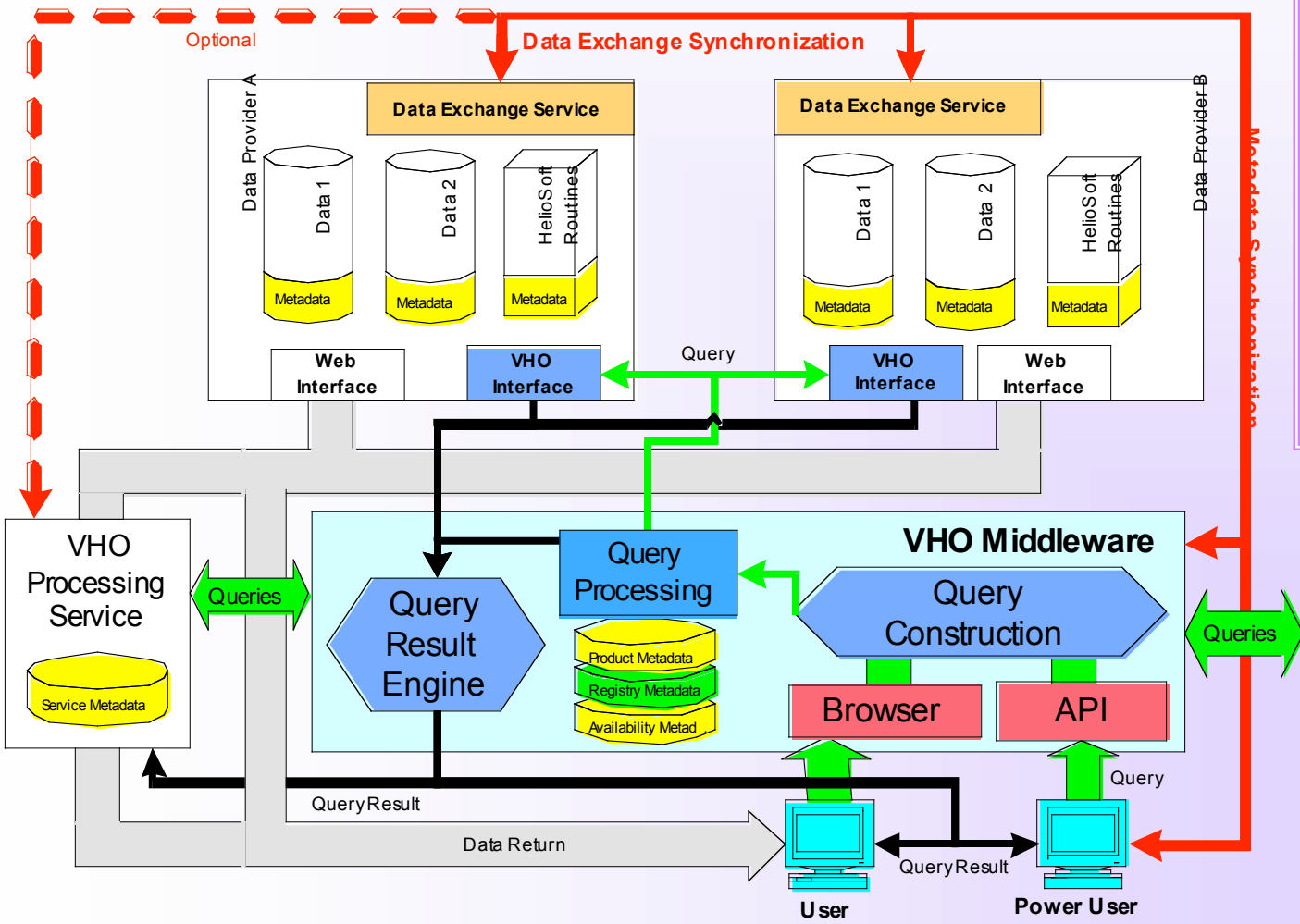


VHO Development Phases (2)
Basic VHO



- Middleware with both Web and API user interfaces.
- VHO interfaces at data provider sites to facilitate complex queries.
- Public access to software tools with metadata.

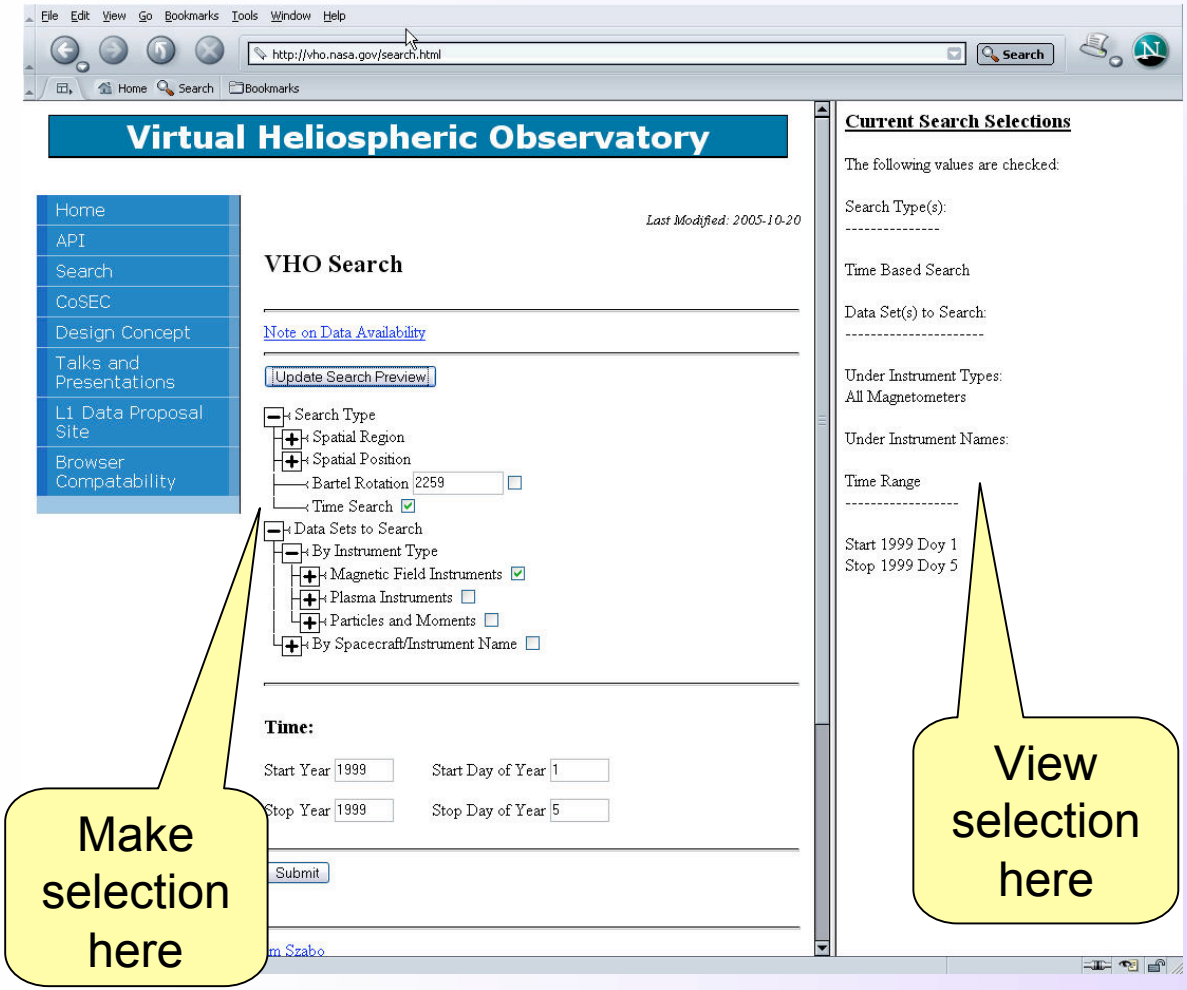
VHO Development Phases (3)
Full VHO



- Connection to processing services.
- Connection to other VxOs

Search Options

Data can be searched for by the following ways:



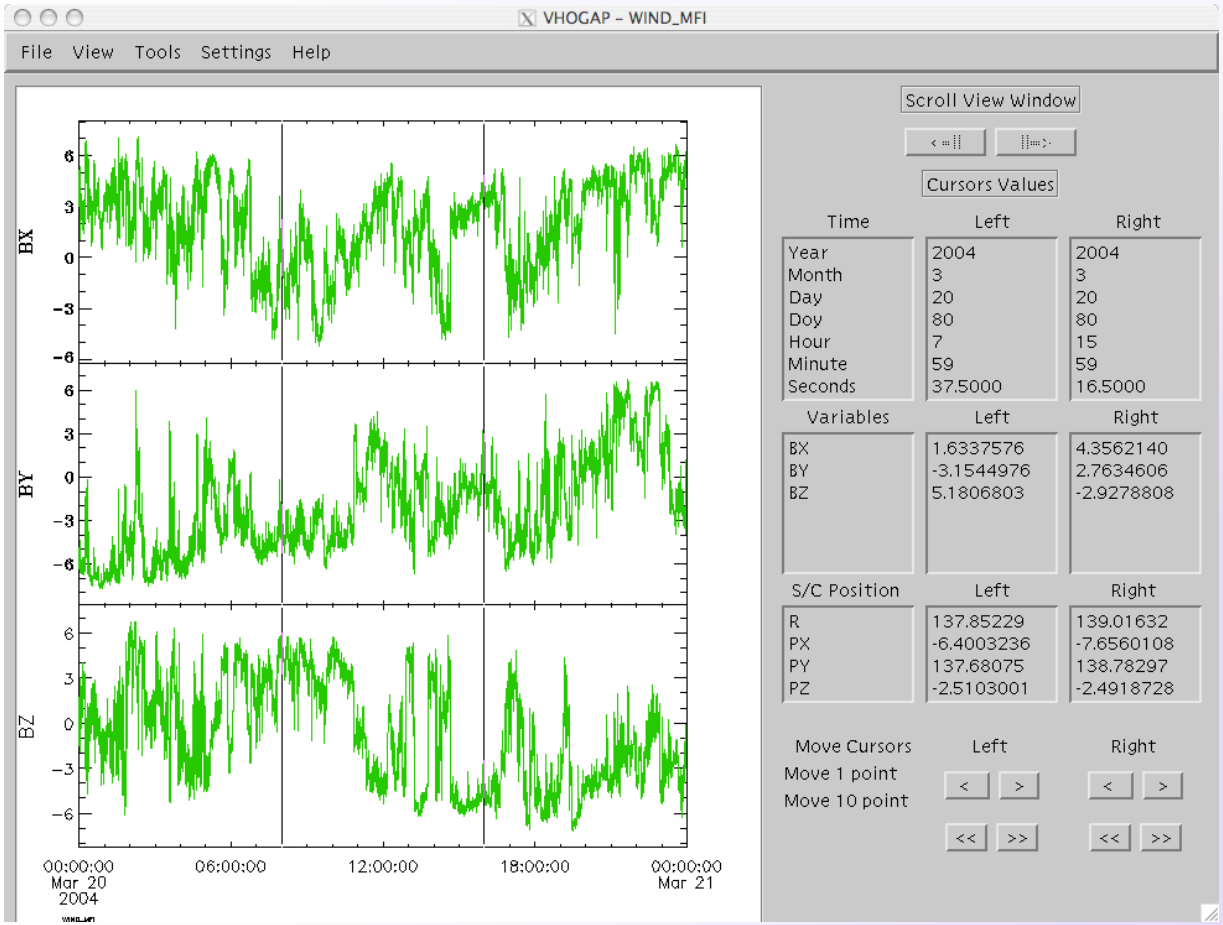
Time
- Date/Time
- Bartel/Carrington Rot.

S/C Location
- GSE/GSM/HGI coord.
- Region name

Measurement Type
- e.g., magnetic field, thermal plasma, energetic particles

Demo VHO API

The VHO API can connect user written programs to VHO functionality without going through a browser.



An IDL Virtual Machine program will be distributed by the VHO team to demonstrate the VHO API. Demo will allow search and simple visualization of data.

HelioSoft

- During the early phases of VHO development, access will be provided to IDL tools already developed by data providers (e.g., readers, simple visualization tools)
- IDL routines will be described in a standard metadata format.
- VHO will allow searches for these IDL routines.
- During later phases of VHO, a uniform data environment will be established that will allow seamless interaction of contributed routines.
- The HelioSoft library will be populated by the user community.

Web Services

- The full VHO will connect data processing web services to the data products and users allowing “one-stop” shopping for data, metadata, software tools, and web services.

- While the VHO Middleware will never contain any data processing services, it will allow searches for relevant services redirecting the user to them. Then the services will have the option to use VHO data location capabilities.

- A standardized metadata format for data processing services will be developed.

VxO Interaction

- The various discipline VxOs will not be developed along the same blueprints. Therefore, some means of interaction between them will have to be established.
- The VxOs are inherently web services. Therefore, the metadata standards developed for the data processing services will be appropriate to describe the functionalities of the various VxOs.
- Passing queries and query results between VHO, VSO, VSPO and VMO will be demonstrated allowing searches that are not discipline specific.

VHO Metadata

Static Metadata (requiring no or infrequent updates)
- Product Metadata – Complete description of data content.
- Registry Metadata – Data service information
- Service Metadata – Complete description of web services.
- VHO Metadata – Description of VHO functionality.

Dynamic Metadata
(requiring daily updates)
- Availability – Current range of available data.
- Software – Current list of available software tools.

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Data Provider Requirements

- The VHO is designed to minimize requirements on data providers. The VHO will work with any currently available data formats or services.
- The VHO team will assist data providers in the one-time generation of the detailed product metadata.
- Data providers will have to allow access to their products. The preferred mechanism will be via the VHO team provided VHO Interface, but standard HTTP or FTP access is also acceptable.
- Data providers will have to allow the VHO synchronization routines to run on their machine providing metadata updates.

Community Input

- The VHO team is actively seeking community input to improve the functionality of VHO.
- Submit recommendations via our web page:
  http://vho.nasa.gov
- Bi-annual VHO meetings at AGU conferences.
  1st meeting at 2006 Spring AGU.
- VHO team membership is open to volunteers.